

**INTEGRATED ELECTROSTATIC INDUCTIVE COUPLING  
FOR PLASMA PROCESSING**

**Abstract of the Disclosure:**

An integrated electrostatic inductively-coupled (i-ESIC) device is provided for  
5 plasma processing that may be used as a primary or secondary source for generating a  
plasma to prepare substrates for, and to process substrates by applying, dielectric and  
conductive coatings. The i-ESIC device is practical for processing advanced  
semiconductor devices and integrated circuits that require uniform and dense plasma.  
The invention may be embodied in an apparatus that contains a substrate support,  
10 typically including an electrostatic chuck, that controls ion energy by capacitively  
coupling RF power to the plasma and generating voltage bias on the wafer relative to the  
plasma potential. An integrated inductive coupling element is provided at the perimeter  
of the substrate support that increases plasma density at the perimeter of the wafer,  
compensating for the radial loss of charged particles toward chamber walls, to produce  
15 uniform plasma density above the processed wafer. An annular slotted shield protects  
the inductive coupling element from the plasma and provides conditions for effective  
inductive coupling of RF power into the plasma, such as eliminating capacitive coupling  
from the element to the plasma and unwanted sputtering of the element. The i-ESIC  
device has a capacitive coupling zone in its center where wafers are placed and an  
20 inductive coupling zone at the perimeter of the wafer coupled to a matching network and  
RF generator. Both zones together with plasma create a resonant circuit.